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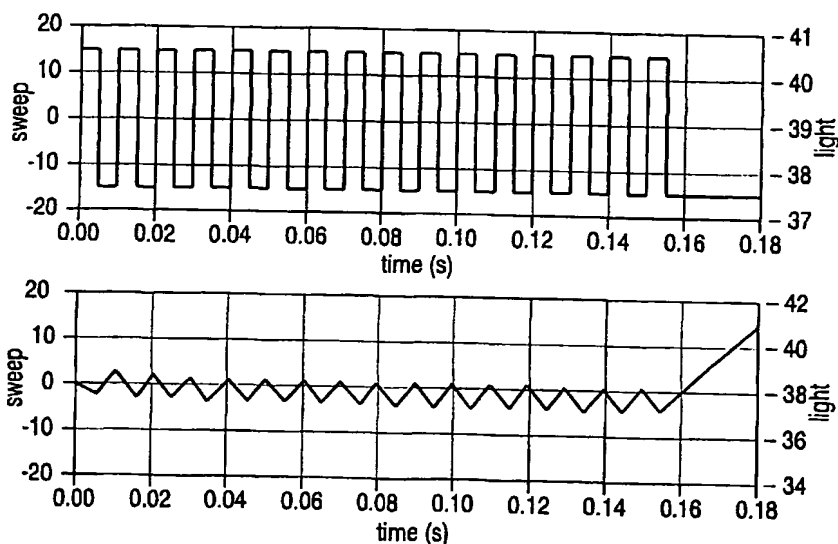
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[Continued on next page]

(54) Title: ELECTROPHORETIC DISPLAY DEVICE



(57) Abstract: A display device comprises electrophoretic particles, a display element comprising a pixel electrode and a counter electrode between which a portion of the electrophoretic particles are present and a controller for supplying a drive signal to the electrodes to bring the display element in a predetermined black or white state, corresponding to the image information to be displayed. In order to improve the refresh time of the display, the controller is further arranged for supplying a preset signal preceding the drive signal comprising a preset pulse having an energy sufficient to release the electrophoretic particles at a first position near one of the two electrodes corresponding to a black state, but too low to enable the particles to reach a second position near the other electrode corresponding to a white state. The duration of the preset pulses is less than 19 msec, preferably between 1 and 10 msec. Setting the duration of the preset pulses to less than 19 msec reduced visible flicker F.

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SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Declaration under Rule 4.17:

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/IB2004/050562

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G09G3/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/196207 A1 (MACHIDA YOSHINORI ET AL) 26 December 2002 (2002-12-26) the whole document	1-10,12, 13,17,18
X	US 2002/033784 A1 (MACHIDA YOSHINORI ET AL) 21 March 2002 (2002-03-21) the whole document	1,3-7,9, 10,12, 13,17,18

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2004/050562

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-10, 12, 13, 17, 18

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-10,12,13,17,18

The first concept concerns an electrophoretic display with a drive means applying a preset pulse before the drive pulse, wherein the preset pulse has a duration of less than 19 msec and more than 0.5 msec.

2. claims: 11,14-16

The second concept concerns an electrophoretic display with a drive means applying a preset pulse before the drive pulse, wherein the preset pulse has a duration of less than 19 msec, and wherein a first preset signal having a first phase is applied to a first group of display elements, and a second preset signal having a second phase opposite to the first phase is applied to a second group of display elements.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/IB2004/050562

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002196207 A1	26-12-2002	JP 2003005227 A	08-01-2003
US 2002033784 A1	21-03-2002	JP 2002082361 A	22-03-2002